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(54) Title of the invention:

IMAGE INFORMATION STORING APPARATUS AND IMAGE PROCESSING APPARATUS INCLUDING IMAGE INFORMATION STORING APPARATUS

(57) [Abstract]

[Problem to be Solved]

To provide an image processing apparatus including access controlling means for an external storing apparatus including a removable storing medium such as a CD, the means speeding up a processing rate by a simple arrangement.

[Solution]

A function is provided, which divides a storing area of a CD, collectively stores usage status data of each block in a dedicated area on a medium, and designates a block to be used with the management data.

The figure is a table for saving one image in five blocks, the first image information table includes a prescribed number of groups of an image number, a start block number, and savability (writability) information, and the second table includes a prescribed number of groups of a next block number or a final block number, and savability information. It is possible to previously estimate the abnormality of the writing with the savability information to prevent a writing error, and to avoid the writing abnormal processing for the controlling, so that the processing is speeded up.

[Claims for the Patent]

[Claim 1]

An image information storing apparatus, characterized by comprising:

internal storing means for storing image information inputted through inputting means;

external storing means for transferring the image information with said internal storing means, and using a removable storing medium; and

memory controlling means for controlling to read/write the image information for said storing means,

wherein said memory controlling means;

manages data indicating a usage status of each storing area obtained by dividing and defining the storing medium of said external storing means; and

includes a function for designating the storing area used for saving the image information according to the area managing data.

[Claim 2]

The image information storing apparatus according to claim 1, characterized in that

the data indicating a usage status of the storing area includes the number of writing times.

[Claim 3]

The image information storing apparatus according to claim 2, characterized in that

when the number of writing times indicating a usage status of the storing area reaches a prescribed limit value, said memory controlling means causes the storing area to be unusable.

[Claim 4]

The image information storing apparatus according to claim 1, characterized in that

the data indicating a usage status of the storing area includes usability information determined based on the number of writing times.

[Claim 5]

The image information storing apparatus according to any one of claims 1 to 4, characterized in that

the data indicating a usage status of the storing area is saved on the storing medium of said external storing means.

[Claim 6]

The image information storing apparatus according to claim 5, characterized in that

the data indicating a usage status of the storing area is collectively saved in the dedicated storing area on the storing medium.

[Claim 7]

The image information storing apparatus according to any one of claims 1 to 6, characterized in that

when designating the plurality of storing areas for one unit of image information, the function for designating the storing area causes an unusable area not to be included between the plurality of designated areas.

[Claim 8]

An image processing apparatus, characterized by comprising:

the image information storing apparatus according to any one of claims 1 to 7, including image reading means and /or an interface for inputting image information generated outside as inputting means; and

image forming means for generating an image based on the image information outputted from the image information storing apparatus.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to an image processing apparatus for processing and storing image information (e.g. a digital copying machine, a printing apparatus, a facsimileing apparatus, a scanner, an electronic filing apparatus, and an image processing apparatus such as a complex machine including a plurality of functions of such apparatuses), more particularly, to a technique for managing a writing area in storing means using a removable storing medium such as a CD, in which image information is transferred with an internal memory of the image processing apparatus.

[0002]

[Conventional Art]

In recent years, the digital copying machine incorporates a semiconductor memory and a large-capacity hard disk for storing document image date to be copied, thereby, can copy a plurality of sheets by scanning a document one time, and can electrically sort to output in order of page numbers. The digital copying machine is also provided with a copy server function for storing image data read from a scanner, and image data obtained by rendering (bit-mapping) character codes in the large-capacity hard disk, and after that, outputting the saved image data. In addition, the digital copying machine transfers the

image data in the hard disk to a storing medium which is removable in the digital copying machine, thereby, enables the image data in the hard disk in the copying machine to be backed-up or be saved for a long term. That is, the digital copying machine is provided with an external storing apparatus for reading image information from a removable storing medium, and writing image information in the storing medium, and an internal storing apparatus for storing image data read from a document and image data transferred from the external storing apparatus, and the like, and copies an image saved in the internal and external storing apparatuses by utilizing the internal and external storing apparatuses. Noted that, the following large-capacity storing media are used as a removable storing medium: a writable CD-R; a writable/ rewritable CD-RW; a large-capacity DVD; and a data tape.

[0003]

Each of the following apparatuses is the image processing apparatus as described above. For example, an image processing apparatus disclosed in Japanese Patent No. 2622376 stores image data, and information and an operation procedure program for copying the image data in a removable storing medium, thereby, improves the operability. When writing image data in a removable storing medium, a digital copying machine disclosed in Japanese Patent No. 2760396 reduces a size

of the image data according to a remaining capacity of the storing medium, thereby, causes the continuous image date to be saved only in one storing medium. When a removable storing medium is mounted, the removable storing medium storing image data and copying mode information, and a sensor detects the mounting, a copying apparatus disclosed in Japanese Patent Laid-Open No. 4-205270 can efficiently write each of the information in a recording medium. And, a copying machine disclosed in Japanese Patent Laid-Open No. 6-311375 encrypts image data to store the image data in a removable storing medium. As described above, in an image forming apparatus including a function for storing a plurality of pieces of inputted image data, and outputting a plurality of groups of image data in the order which is different from the inputting order (sorting operation), or outputting a plurality of pieces of inputted data by outputting an image one time (collectively), it becomes necessary to provide internal image storing means for storing the image data in the apparatus and manage image signal to be inputted and outputted, and it also becomes necessary to satisfy such a need that an internal image storing apparatus is backed-up by the external storing apparatus including a removable large-capacity storing medium (a storing medium such as a magnet-optical disk, a CD-R, and a CD-RW), and the image signal saved in the internal image

storing apparatus is outputted again, and is transferred to a remote area to be outputted, so that the variety of apparatuses as described above are proposed.

[0004]

[Problems to be Solved by the Invention]

However, when a plurality of image signals are inputted and outputted, a multi-functional peripheral provided with image inputting and outputting functions such as a copying machine, a facsimile, a printer, and a scanner is also required to execute a parallel operation for inputting and outputting a plurality of image signals at the same time, such as an operation for transmitting a facsimile while an image signal of a printer is being outputted. When the parallel operation is induced, and storing means is required to input and output a plurality of image signals at the same time, a processing rate is determined according to a transferring rate for transferring each of the image signals, and data. Generally, a data transferring rate of a removable storing medium such as a CD-R is lower as compared with a semiconductor memory since including a mechanical operating unit, so that a processing rate (productivity) of the image forming apparatus is lowered when inputting and outputting data by using such an external storing apparatus, and when a quick processing is required, it is not possible to satisfy

the requirement. The above conventional techniques do not propose a solution for such a problem that a data transferring rate of this removable storing medium such as a CD-R is increased. The present invention has been invented in consideration of the above problem of the conventional techniques in an image information storing apparatus provided with internal storing means of an apparatus, the internal storing means such as a semiconductor memory, HD, and the like, and storing image information inputted through inputting means, and external storing means for transferring the image information with the internal storing means, and using a removable storing medium such as a CD, and an object of the present invention is to provide the image information storing apparatus provided with access controlling means of the external storing means using the removable storing medium such as a CD, the access controlling means increasing the processing rate with a simple arrangement, and the image processing apparatus provided with the image information storing apparatus (e.g. a digital copying machine, a printing apparatus, a facsimileing apparatus, a scanner, an electronic filing apparatus, and a multi-functional peripheral provided with a plurality of functions of such apparatuses).

[0005]

[Means for Solving the Problems]

An invention of the claim 1 is an image information storing apparatus, characterized by including internal storing means for storing image information inputted through inputting means, external storing means for transferring the image information with the internal storing means, and using a removable storing medium, and memory controlling means for controlling to read/written the image information for the storing means, and the memory controlling means is provided with functions for managing data indicating a usage status of each storing area obtained by dividing and defining a storing medium of the external storing means, and designating the storing area used for saving the image information according the area management data.

[0006]

An invention of the claim 2 is characterized in that, in the image information storing apparatus according to the claim 1, the data indicating the usage status of the storing area includes the number of writing times.

[0007]

An invention of the claim 3 is characterized in that, in the image information storing apparatus according to the claim 2, when the number of writing times indicating the usage status of the storing area reaches a prescribed limit value, the memory

controlling means causes the storing area to be unusable.

[0008]

An invention of the claim 4 is characterized in that, in the image information storing apparatus according to the claim 1, the data indicating the usage status of the storing area includes usability information determined based on the number of writing times.

[0009]

An invention of the claim 5 is characterized in that, in the image information storing apparatus according to any one of the claims 1 to 4, the data indicating the usage status of the storing area is saved on the storing medium of the external storing means.

[0010]

An invention of the claim 6 is characterized in that, in the image information storing apparatus according to the claim 5, the data indicating the usage status of the storing area is collectively saved in the dedicated storing area on the storing medium.

[0011]

An invention of the claim 7 is characterized in that, in the image information storing apparatus according to any one of the claims 1 to 6, when designating the plurality of storing areas for one unit

of image information, the function for designating the storing area causes an unusable area not to be included among the plurality of designated areas.

[0012]

An invention of the claim 8 is an image processing apparatus, characterized by including the image information storing apparatus according to any one of the claims 1 to 7, the image information storing apparatus including, as inputting means, image reading means and/or an interface for inputting the image information generated outside, and image forming means for generating an image based on the image information outputted from the image information storing apparatus.

[0013]

[Embodiments of the Invention]

The present invention will be described based on the following embodiment with the attached drawings. This embodiment is applied as an image processing apparatus to a digital multi-functional peripheral (a digital copying machine provided with a plurality of functions including a copying function, a printing function, and the like). Figure 1 illustrates a rough diagram of a total arrangement of the digital multi-functional peripheral according to the embodiment of the present invention. Referring to Figure 1, an apparatus arrangement, functions, and operations of the present machine will be described below according to a

flow of operations for copying a document, the operations including reading a document, processing the read image data, and writing an image with the processed data. When a start key 34 of an operation unit 30 (refer to Figure 2) is pushed by a user, a bundle of documents, whose image surface is in an upward direction, placed on a document stage 2 provided in an automatic document feeder (hereinafter, described as [ADF]) 1 are carried to a prescribed position on a contact glass 6 by a carrying roller 3 and a carrying belt 4 in order from the lowest document to the upper one. At this time, the number of sheets of read documents is managed by a counting function for counting up the number of sheets of documents every time it is completed to carry one sheet of document. Image data of the carried document on the contact glass 6 is read by a reading unit 50, and the read document is ejected by the carrying belt 4 and an ejecting roller 5. When it is detected by a document set detector 7 that next document is placed on the document stage 2, the document is also carried to the contact glass 6 like the previous document. A transferring motor 26 (refer to Figure 4) drives the carrying roller 3, the carrying belt 4, and the ejecting roller 5.
[0014]

A writing unit 57 controls a light emission of a laser of a laser outputting unit 58 in the writing unit

57 with generation image data generated based on image data read by the reading unit 50, and generates a latent image on a photoreceptor 15 by the laser writing. When the photoreceptor 15 including the latent image passes through a developing unit 27, toner is attached to the latent image, and a toner image is formed. While a sheet of transcription paper is being carried by a carrying belt 16 at a rate which is the same as a rotation rate of the photoreceptor 15 holding the toner image, the toner image on the photoreceptor 15 is transcribed on the transcription paper. The sheets of transcription paper stacked in a first tray 8, a second tray 9, and a third tray 10 are fed by a first paper feeding apparatus 11, a second paper feeding apparatus 12, and a third paper feeding apparatus 13 respectively, and are carried by a vertical carrying unit 14 up to a position contacting to the photoreceptor 15. After that, an image of the transcription paper including the transcribed toner image is fixed by a fixing unit 17, and the transcription paper is ejected to a finisher 100 of a post-processing apparatus by a paper ejecting unit 18.

[0015]

The finisher 100 of a post-processing apparatus can lead the transcription paper carried by the paper ejecting unit 18 of a main box to a direction of a paper ejecting tray 104, and a direction of a staple

stage 108. By switching a switching board 101 downward, the finisher 100 can eject the transcription paper to the paper ejecting tray 104 side through a carrying roller 103. By switching the switching board 101 upward, the finisher 100 can carry the transcription paper to the staple stage 108 through carrying rollers 105 and 107. Paper sides of the sheets of transcription paper stacked on the staple stage 108 are arranged by a jogger 109 for arranging paper every time a sheet of transcription paper is ejected, and a group of transcription paper is copied to be sewed by a stapler 106. The group of transcription paper sewed by the stapler 106 is saved in a staple completed paper ejecting tray 110 by the own weight. On the other hand, the paper ejecting tray 104 is a paper ejecting tray which can move backward and forward. The paper ejecting tray 104 which can move backward and forward moves backward and forward for each document or for each group of copies sorted by an image memory, and easily sorts ejected copied paper.

[0016]

When images are generated in both sides of the transcription paper, the transcription paper which is fed from each of paper feeding trays 8 to 10 and is image-generated is not led to the paper ejecting tray 104, but is temporarily stocked in a both side paper feeding unit 111 by setting a turning nail 112 for

switching a path in an upper side. After that, the transcription paper stocked in the both side paper feeding unit 111 is fed again from the both side paper feeding unit 111 to transcribe again a toner image generated in the photoreceptor 15, and is led to the paper ejecting tray 104 by setting the turning nail 112 for switching a path in a down side this time. When images are generated in both sides of the transcription paper, the both side paper feeding unit 111 is used as described above. A main motor 25 (refer to Figure 4) drives the photoreceptor 15, the carrying belt 16, the fixing unit 17, the paper ejecting unit 18, and the developing unit 27, and each of paper feeding apparatuses 11 to 13 is driven by a driving force of the main motor 25, the driving force being transferred by each of paper feeding clutches 22 to 24 (refer to Figure 4). The vertical carrying unit 14 is driven by the driving force of the main motor 25, the driving force being transferred by an intermediate clutch 21 (refer to Figure 4).

[0017]

Figure 2 illustrates the operation unit 30 provided for a user to input an instruction in the apparatus of Figure 1. The operation unit 30 includes a liquid crystal touch panel 31, ten keys 32, a clear/stop key 33, a print key (start key) 34, a pre-heating key 35, a reset key 36, an initial setting key

37, a copy key 38, a copy server key 39, a text managing key 40, and a printer key 41, and the liquid crystal touch panel 31 displays a variety of functional keys, messages illustrating the number of copies and machine statuses, and the like. By pushing the initial setting key 37, the initial status of the machine can be arbitrarily customized. For example, a size of paper saved in the machine, and the status set when a mode clear key of a copying function is pushed can be arbitrary set. It is possible to select an application, and the like selected by priority when no operation is executed for a certain time, to set a time for migrating to a low electric power according to the international energy star plan, and to set a time for migrating to a sleeping mode. By pushing the copy key 38, the copying function can be used. The copy server key 39 is used when a document image read from the scanner is accumulated and the accumulated image and an accumulated image by a printer function are printed (and, setting and deleting a copy mode). Noted that, the copy server operation will be described later in detail.

[0018]

Figure 3 illustrates an example of a display of the liquid crystal touch panel 31 in the operation unit 30 (Figure 2). The present example illustrates a display screen when the copy server key 39 is pushed.

In this screen, when a user touches a key displayed in the liquid crystal touch panel 31, a color of a key indicating a selected function is inverted to black. When it is necessary to designate a function detail (for example, when a printing condition is designated), a screen for setting a detailed function is displayed by touching the key. As described above, as using a dot display, the liquid crystal touch panel can graphically display an optimum display at that time. A display screen illustrated in Figure 3 is a display example displayed in the liquid crystal touch panel 31 when the copy server key 39 illustrated in Figure 2 is pushed, and in a display area, a user ID (a user identifying code), a text name, the number of pages, an accumulation time, a printing order, a size (amount of data) are displayed as image management information for specifying image data already accumulated in an internal image storing unit. The user ID is generated in a printer driver of a personal computer connected to the present apparatus, so that the user ID is displayed only when an image is accumulated by a printer function. The text name is generated every time an image is accumulated. The number of pages is the number of accumulated document images. The accumulation time is a time when image data is accumulated, and the printing order is generated when a plurality of pieces of accumulated image data are printed. Noted that, the

displayed image management information is stored in a non-volatile memory NV-RAM 74, and is continuously maintained even when an electric power is turned off. As illustrated in Figure 3, in an operation unit display screen, a [copying a text to an external medium] key is displayed, the key being a key for copying image information (image data and image management information) to an external storing apparatus (Figure 5, an external storing apparatus 76). [0019]

Figure 4 is a block diagram illustrating a controlling apparatus, whose center is a main controller, of this digital multi-functional peripheral. A main controller 20 controls the whole digital multi-functional peripheral. The main controller 20 is connected to a distributed controlling apparatus such as the operation unit 30 for displaying for a user with the liquid crystal display 31, and controlling a function setting input by keys 32 to 35 from the user, an image processing unit (IPU) 49 for controlling a scanner, controlling a document image to be written in an image memory, and controlling to generate an image from the image memory, and a automatic document feeder (ADF) 1 including the transferring motor 26, and the document set detector 7. Each distributed controlling apparatus and the main controller 20 communicate a machine status and an operation instruction to each

other as needed. The main motor 25 necessary for carrying paper, and the like, and a variety of clutches 21 to 24 necessary for transferring a driving force to each of the vertical carrying unit 14 and the first to third paper feeding apparatuses 11 to 13 are also connected.

[0020]

Returning to Figure 1, operations of the digital multi-functional peripheral of the present embodiment from reading a document to writing an image will be described in more detail. The operations are executed mainly by a reading unit 50 and a writing unit 57. The reading unit 50 comprises the contact glass 6 on which a document is placed and a scanning optical system, and the scanning optical system comprises an exposure lamp 51, a first mirror 52, a lens 53, a CCD image sensor 54, and the like. The exposure lamp 51 and the first mirror 52 are fixed on a first carriage (not illustrated), and a second mirror 55 and a third mirror 56 are fixed on a second carriage (not illustrated). When a document image is read, the first carriage and the second carriage are mechanically operated so as to move at a relative rate of two to one so that an optical path length is not changed. This scanning optical system is driven by a scanner driving motor (not illustrated). The document image is read by the

CCD image sensor 54, and is converted to an electrical signal to be processed.

[0021]

The writing unit 57 comprises a laser outputting unit 58, an imaging lens 59, and a mirror 60, and in the laser outputting unit 58, a laser diode which is a laser light source, and a polygonal mirror rotating at a high and constant rate by a motor are provided. When a laser light outputted from the writing unit 57 irradiates the photoreceptor 15 of an image generating system with a main scanning, and at the same time, irradiates a beam sensor (not illustrated) provided at a light-receiving position around one side of the photoreceptor 15, a main scan synchronizing signal is induced. A controlling signal is generated based on this main scan synchronizing signal, the controlling signal controlling an image recoding start timing in a main scanning direction, and inputting and outputting an after-mentioned image signal.

[0022]

Next, such an image data processing, in which an image processing unit (IPU) is a center, in the present embodiment will be described in detail, that image data to be inputted to the writing unit 57 is generated from an image signal read by the reading unit 50. Figure 5 illustrates a block diagram of a circuit arrangement of an image processing unit (IPU) 49. A reflected light

from a document illuminated by the exposure lamp 51 is photoelectrically converted by the CCD image sensor 54, and is converted to a digital signal by an A/D converter 61. After being processed by a shading correction 62, the image signal converted to a digital signal is processed by an image processing unit 63 for MTF correction and □ correction, and the like. Next, after being expanded or reduced according to a scaling rate by passing through a scaling processing unit 72, the image signal is inputted to a selector 64. A destination for transferring the image signal is switched by the selector 64 to a writing □ correction unit 71 or to an image memory controller 65. The writing □ of the image signal passing through the writing □ correction unit 71 is corrected according to an image generating condition, and the image signal is transferred to the writing unit 57.

[0023]

The image memory controller 65 and the selector 64 are arranged so that the image signal can be bi-directionally inputted and outputted. The image processing unit (IPU) 49 is provided with a CPU 68 for setting a variety of settings to the image memory controller 65, and the like, and controlling the reading unit 50 and the writing unit 57, and a ROM 69, a RAM 70, and the NV-RAM 74 for saving a program and data used for executing such units. The CPU 68 writes

and reads data of an image memory 66 through the image memory controller 65, accumulates the document image in the image memory 66, an HD 75, or the external storing apparatus 76, reads the accumulated image, and transfers the extracted image between the image memory 66 and the HD 75, or between the image memory 66 and the external storing apparatus 76, or outputs the extracted image to the writing unit 57. Here, after the image data is compressed by an image compressing apparatus in the image memory controller 65, the document image transferred to the image memory controller 65 is transferred to the image memory 66. While it is possible to directly write data of 256 tones of a maximum image size to the image memory 66, extremely large capacity of the image memory is needed for one sheet of uncompressed document image, so that the limited image memory can be efficiently utilized by compressing an image. This is because the image is compressed.

[0024]

If an image is compressed, a large amount of document image data can be stored at the same time, so that as a sorting function, the saved document image data can be outputted in order of the page numbers. In this case, when the image is outputted, it is necessary to sequentially expand the compressed data of the image memory 66 by an expanding apparatus in the image memory

controller 65 to output the expanded data. Such a function is generally called to as [electronic sort]. By utilizing the function of the image memory 66, it also becomes possible to sequentially write a plurality of sheets of document images in areas obtained by dividing an area of a sheet of transcription paper of the image memory 66 into quarters. For example, by sequentially write four sheets of document images to the areas obtained by dividing an area of a sheet of transcription paper of the image memory 66 into quarters, four sheets of documents are combined in a sheet of transcription paper image, and a collected copy can be outputted. Such a function is generally called to as [collection copy].

[0025]

The images of the image memory 66 can be accessed from the CPU 68. Content of the image data saved in the image memory 66 can be processed with this arrangement, and for example, it is possible to thin an image, and to cut out an image. For the processing, the image data saved in the image memory 66 can be processed by writing data in a register of the image memory controller 65. The processed image is saved again in the image memory 66. The image memory 66 has an arrangement capable of inputting and outputting the image data at the same time by dividing the image data to a plurality of areas according to the size of the

image data to be processed. The image memory 66 can be connected to two groups of address/data lines for the writing and the reading to an interface with the image memory controller 65 to enable the image data to be inputted and outputted in each divided area in parallel. Thereby, such an operation can be executed that, while the image data is being inputted (written) in an area 1, the image data is outputted (read) from area 2. The image processing unit (IPU) 49 has an arrangement so that content of the image memory 66 can be read by the CPU 68, and can be transferred as image data 73 to the operation unit 30 through an I/O port 67. Generally, since a screen display resolution of the operation unit 30 is low, an original image of the image memory 66 is transferred to the operation unit 30 after being thinned the image.

[0026]

The image memory 66 may be separately provided with the hard disk (HD) 75 to save a large amount of image data. By using the HD 75, it is also characterized that an external power source is not necessary, and an image can be permanently saved. It is general to use this HD 75 to read a plurality of fixed pattern documents (format documents) by a scanner to save the documents. The image processing unit (IPU) 49 is also has an arrangement capable of being connected with the external storing apparatus 76 in

which external storing media CD-R, CD-RW, and DVD whose capacity is larger are removable. A bus of the external storing apparatus 76 is controlled by a SCSI controller, and the external storing apparatus 76 writes and reads an image. When a scanned image is written to the external storing apparatus 76, or when data from the external storing apparatus 76 is transferred to the writing unit 57, the scanned image or the data is also temporarily stored in the image memory 66 to cancel the difference of a processing rate between an output side and an input side. As described above, an image path is determined by the image memory controller 65 for all inputs and outputs of images of the image memory 66, the HD 75, and the external storing apparatus 76, which are apparatuses storing images, scanned images, and images to be transferred to the writing unit 57. Thereby, the CPU 68 can determine the input and output of the image data, and the image memory controller 65 connected to the CPU 68 can switch a flow of the image data.

[0027]

Here, by using Figure 6, a transferring timing of one page of image signal in the selector 64 will be described. In Figure 6, /FGATE is a frame gate signal, and expresses an effective term of a sub scanning direction of one page of image data. /LSYNC is a main scan synchronizing signal of each line, and an image

signal becomes effective in response to a prescribed clock after this signal rises. /LGATE is a line gate signal, and is a signal indicating that an image signal of a main scanning direction is effective. Such signals are synchronized with a pixel clock (pixel synchronizing signal) VCLK, and one pixel, eight bits, (256 tones) of data is transferred for one period of the VCLK. In the present embodiment, for the transcription paper, the writing density is 400 dpi, and the number of maximum pixels of main scanning is 4800 pixels, and the number of maximum pixels of sub scanning is 6800 pixels. In the present embodiment, it is assumed that, the image becomes more white image if the image data is closer to 255.

[0028]

Next, an operation example will be described in which images held in a storing apparatus (hereinafter, described as [internal memory], and in the present embodiment, indicating the image memory 66, HD 75, and the like) incorporated in the present apparatus are copied to the external storing apparatus 76. Noted that, since the copy application is well-known, the detailed description will be omitted. Figure 7 illustrates an arrangement of a software system of the present digital multi-functional peripheral. As illustrated in Figure 7, it is assumed that an function for operating image data accumulated in the internal

memory exists as a copy application processing unit 212, and the copy server application processing unit 212 starts in parallel with a copy application processing unit 211 and a printer application processing unit 213, and each unit independently operates. A system controller 200 arbitrates an operation unit, a peripheral machine, an image forming apparatus, an image reading apparatus, and each of controllers 221 to 225 of a memory unit, which are shared resources. Each application processing unit can write each operation screen information in a virtual screen area (memory area corresponding to a real screen) provided by an operation unit controller 221. The operation unit controller 221 renders and displays the operation screen information in the virtual screen area on the real screen, the operation screen information being instructed from the system controller 200. When the external storing apparatus 76 is provided, the external storing apparatus 76 is connected to a connecting port of a SCSI controller 232 in Figure 7, and is controlled by the SCSI controller 232.

[0029]

When the image held in the internal memory (the image memory 66, the HD 75, and the like) is copied to the external storing apparatus 76 by using the copy server function, after a text indicated by a user ID (user identification code), a text name, the number of

pages, an accumulating time, a printing order, a size (an amount of data) is selected, in the copy server operation screen (Figure 3) displayed in the liquid crystal touch panel 31 by pushing the copy server key 39 (Figure 2), if a [copy a text to an external medium] key of the operation screen is pushed, the image data and the image information which are being selected are transferred and held in the external storing apparatus 76 including a CD-R, a CD-RW, a magnet-optical disk, and the like as a storing medium. When attribute data necessary for inputting and outputting the image information and the image signal is saved, and is read in a storing medium such as a D-R, a CD-R/W, and a magnet-optical disk which are removable from outside, as managing means of the storing medium for shortening a processing time for the image forming apparatus, when the image data and the image information are held, according to the following method, medium management data indicating a usage status of a storing area with the image information, and the like is written in a management area of a CD-R and a CD-RW, and an access to the storing medium is controlled by using the data. Noted that, in this embodiment, reading/writing means for reading/writing the management data and the image information is realized by the external storing apparatus 76, image information transferring means is realized by the image memory controller 65, the CPU 68,

a data bus, and the like, and other means for executing a variety of controls is realized by the image memory controller 65, the CPU 68, and the like.

[0030]

When an image is copied to the external storing apparatus 76 including a removable storing medium, the present embodiment is provided with first managing means for generating and managing a first image information table for managing the image information stored in the storing medium for each unit image, and second managing means for generating and managing a second image information table for dividing the storing medium to a plurality of blocks whose sizes are equal when the unit image is stored on the storing medium, and assigning block numbers to the blocks to manage each block. By such managing means, the medium management data indicating a usage status of a storing area is generated, and is collectively saved in a dedicated area on the medium. Figure 8 illustrates a structure of the medium management data including the first image information table and the second image information table which are saved on the medium. Noted that, the CPU 68 illustrated in Figure 5 realizes the first managing means and the second managing means. In this embodiment, the internal memory is the image memory 66, the HD (hard disk apparatus) 75, the RAM 70, and the like. As illustrated in Figure 8, the first

image information table 80 for managing the image data for each unit image is stored in the first area, and after that, the second image information table 90 managed by the second managing means is stored.

[0031]

Figure 9 illustrates an arrangement of the first image information table 80. As illustrated in Figure 9, the first image information table 80 comprises a prescribed number of groups (n groups) of tables 800, the group including image number information 800a, start block number information 800b, and savability information 800c. The image number information 800a saves a unique number which is uniquely determined for each one image unit, and is determined so that the same image number does not exist on the storing medium. The start block number information 800b is information indicating a start block position of the corresponding unit image data in the second managing means for block-managing each unit image data. Noted that, the block is a storing area unit obtained by equally dividing the medium to save the image information, and a prescribed number of blocks are attached with numbers to be managed. Information is written in the savability information 800c, the information indicating whether or not data can be written (saved) in each area of the image information table. When the storing medium includes a writing restriction such as a CD-R, CD-RW,

and the like, by using this savability information, it becomes possible to prevent a disadvantage from being induced since the storing medium is used over the writing restriction. When data of the first image information table 80 is generated, the savability information 800c of each table 800 is checked, and if a storable table is found, the image number information 800a is registered in the table, and the storage medium can save the unit images whose number is the same as the number of tables of the first image information table.

[0032]

Figure 10 illustrates an arrangement of the second image information table 90. As illustrated in Figure 10, the second image information table 90 comprises tables 900, the table being a group of next block number information 900a and savability information 900b. The block is a unit area obtained by dividing the storing medium to an equal size, and next block number or a number indicating the end of one unit image data is substituted in the block number 900a of the table 900 so that a series of blocks consisting of one unit image data are connected by a chain (refer to Figure 11). Normally, "0" is substituted to an initial value of the block number information. When a data length of the block number information is two-byte, FFFFh is reserved as the end of the block on the management data,

and others, 0001h to FFFEh, can be used. In this case, when a size of the block is one MB, the storing area up to (1 MB x FFFEh = 65534 MB) can be managed. However, if the block size is caused to be smaller, or the data length of the block number information is caused to be larger, the storing area, and also the block size can be caused to be an arbitrary size. Noted that, the savability information 900b is used like the savability information 800c of the first image information table 800. It is possible to cause the accessing process to be simpler by fixing a capacity of each of tables 800 and 900 in the first and second image information tables 80 and 90.

[0033]

Here, such an operation procedure that new image information including a plurality of blocks of data is registered in the image information table will be described by using a data structure diagram of Figure 11 and an operation flow of Figure 12 and Figure 13. Noted that, here, a data length of the block number information is managed as two bytes. First, a registering procedure for registering the new image information to the first image information table 80 is executed. As illustrated in Figure 12, a loop parameter for retrieving each table 800 of the first image information table 80 is initialized (S001), and next, it is checked whether or not the loop parameter

exceeds the number of the first image information tables (S002). When the loop parameter exceeds the number of tables, an error is notified as deciding that the image information can not be saved (S100), and the process is terminated. If the loop parameter does not exceed the number of tables, the savability information 800c of the table is detected (S003), an image number of the table being not registered in the image number information 800a in the tables 800 indicated by the loop parameter for retrieving each table 800 of the first image information table 80. It is decided from the detected savability information 800c whether or not the image information can be saved (S004). Here, when the number of writing times is saved as the savability information 800c, it is decided by comparing the detected savability information with a limit value whether or not the detected savability information (writing times) reaches the limit value. As a decision result, if the image information can not be saved, the loop parameter is added (S005), the loop parameter being used to retrieve the first image information table, and the process returns to the step of S002. If a decision result of S004 is that the image information can be saved, the image number is registered in the image number information 800a in this table (S006).

[0034]

Next, as illustrated in Figure 13, the loop parameter and an obtained blocks parameter are initialized (S007), the loop parameter and the obtained blocks parameter being used to retrieve each table 900 of the second image information table 90, and next, it is checked whether or not the loop parameter exceeds the number of the second image information tables (S008). When the loop parameter exceeds the number of tables, an error is notified as deciding that the image information can not be saved (S100), the process is terminated. If the loop parameter does not exceed the number of tables, the savability information 900b, 901b, - - - of the table is detected (S009), the table being indicated by the loop parameter for retrieving each table 900, 901, - - - of the second image information table 90. It is decided by comparing the detected savability information with a limit value whether or not the detected savability information reaches the limit value (S010), and as a result, if the image information can not be saved, the loop parameter is added (S011), the loop parameter being used to retrieve each table 900, 901, - - - of the second image information table, and the process returns to the step of S008. If a decision result in S010 is that the image information can be saved, it is determined whether or not the obtained blocks parameter is "0" (S012), and if the parameter is "0", the obtained block

number information is registered as the start block number 800b of the table 800 of the first image information table 80 (S013) (In the example of Figure 11, if the savability information 900b of the table 900 of the block number 0 of the second image information table 90 indicates to be able to save, [0000h] is registered as the start block number information 800b of the first image information table 80). If the parameter is not "0", the step of S013 is skipped.

[0035]

Next, after the obtained blocks parameter is added (S014), it is decided by comparing the obtained blocks parameter with the number of blocks to be obtained whether or not it is completed to secure the blocks to be obtained (S015), and when the blocks to be obtained have been secured, FFFFh which means the end of the blocks is registered in the block number information 900b, 901b, - - - of the second image information table 90, the block number information being indicated by the the block number which has been previous time obtained (S016) (In the example of Figure 11, since the number of obtained blocks is five, and the fifth block is the last image, [0000h] is registered as the block number 903a of the fourth table 903 of the second image information table 90), and it is notified that it has been succeeded to obtain the block (S200), and the process is terminated. On the other hand, at the step

of S015, when it is not completed to obtain the blocks to be obtained, the block number obtained this time is registered in the block number information of the second image information table, the block number information being indicated by the block number obtained previous time (S017) (In the example of Figure 11, if the table 901 of the block number 1 of the second image information table 90 indicates to be able to save, [0001h] is registered as an image of the second block, i.e. next block number 900a in the table 900 of the block number 0 of the second image information table 90), and after that, the loop parameter is added at step S011, the process returns to step S008, and it is repeated to retrieve the tables 902, 903, - - - of the second image information table. Noted that, while it is not apparently described in the present embodiment, it is also possible to provided means for clearing data of the obtained first image information table and second image information table before the error is notified and the process is terminated.

[0036]

Thereby, when the external storing apparatus 76 is utilized, by registering the use for each block in which the image information on the storing medium is stored, it is possible to understand such a usage status whether or not being used, or how many is the

number of writing times, the abnormality such as a writing failure can be previously estimated, and it is not necessary for the controlling to execute the abnormal process after the writing, so that the processing is speeded up. By writing the management information of each block, the saving status being registered in the management information, in a dedicated area, such a process is also speeded up when the external storing apparatus 76 accesses the storing medium to write/read.

[0037]

Such a method can be adopted that the savability information managed for each block illustrated in Figures 9 to 11 is designated as the number of writing times, and the number of writing times is added every time the external storing apparatus 76 is used. According to this method, it becomes possible with simple means to detect the usage status of the block, to set a using limit, and to decide the savability. When the savability information is designated as the writing times, and a CD-R is used as the storing medium, if the savability information detected upon being used is "1", it is decided that the image information can not be saved, and when a CD-RW is used, limit times value for limiting the writing is provided, and if the number of writing times exceeds the provided value, it is decided that the image information can not be saved.

[0038]

As described above, in the present invention, since the usage status of the storing medium is managed for each block, such a method is a normal procedure that the savability is basically checked for each block, and the usable blocks are registered in order that the blocks are arranged. According to this procedure, if the block is being used as deleting the saved image, or repeating the overwriting, when the image unit is saved, which needs to use a plurality of blocks to save the whole image, one unit of image is not always saved in the continuous blocks depending on a status of the usable blocks. If one unit of image is distributedly saved in separated blocks, a longer access time is needed. To avoid such a problem, when the second image information table is obtained for an image which needs the plurality of storing areas, the storing area is controlled to be obtained, the storing area becoming the continuous blocks without including an unusable area such as an area, whose writing times exceeds a limit of the writing times, between the blocks. As described above, by saving one unit of image in the continuous blocks, a writing/reading rate can be increased, and the productivity can be improved.

[0039]

[Advantages of the Invention]

(1) An operational effect for an invention of the claim 1.

By managing data indicating the usage status of each divided storing area on a medium of storing means using a removable storing medium such as a CD, and being with a function for designating the storing area used for storing image information by this management data, it is possible to access the storing area by previously deciding whether or not the image information can be written to each storing area, so that the abnormality such as a writing failure is avoided, and it is not necessary to execute the abnormal processing after the writing for the control, so that the processing is speeded up.

(2) An effect for an invention of the claim 2.

As adding to the effect of the above (1), by causing data indicating the usage status of the storing area to include the number of writing times, when the storing medium (a CD-R, a CD-RW, and the like) including a limit of the number of writing times is used, as considering the usage status of each storing area, the storing area to be used is selected. That is, for example, in a CD-RW, the number of writing times on the recording surface is limited, and if the number of writing times exceeds the limited times, the writing becomes out of assurance, so that it can not be previously estimated when the following writing is

failed (writing error), however, it becomes possible to previously detect the abnormality such as the writing failure by managing the number of writing times, and by avoiding the writing failure, more stable performance becomes able to be obtained.

(3) An effect for an invention of the claim 3.

As adding to the effect of the above (2), when the number of writing times indicating the usage status of the storing area reaches a prescribed limit value, by causing the area to be unusable, and avoiding the abnormality such as the writing failure, effective embodying means of the invention of the claim 2 can be provided.

(4) An effect for an invention of the claim 4.

As adding to the effect of the above (1), data indicating the usage status of the storing area is designated to be usability information determined based on the number of writing times, and the usability is previously decided, so that the accessing can be more speeded up.

[0040]

(5) An effect for an invention of the claim 5.

As adding to the effects of the above (1) to (4), since data indicating the usage status of the storing area is saved on the medium as an attribute of the storing medium, if an apparatus side includes the corresponding function, the medium can be loaded to any

apparatus, and a merit as a removable storing medium can be utilized.

(6) An effect for an invention of the claim 6.

As adding to the effect of the above (5), by collectively saving data indicating the usage status of the storing area in a dedicated area of the medium, the access does not need much time, and the processing can be speeded up.

(7) An effect for an invention of the claim 7.

As adding to the effects of the above (1) to (6), when a plurality of areas are designated for one unit of image information, by causing an unusable area not to be included between the plurality of designated areas, and securing continuous areas, it becomes possible to increase a writing/reading rate, speed up the processing, and improve the productivity.

(8) An effect for an invention of the claim 8.

In an image information storing apparatus according to any one of the claims 1 to 7, the image information storing apparatus being provided as inputting means with image reading means and /or an interface inputting the image information generated outside, and the image processing apparatus (e.g. a digital copying machine, a printing apparatus, a facsimileing apparatus, a scanner, an electronic filing apparatus, and a multi-functional peripheral including a plurality of functions of such units, and the like)

provided with image forming means for generating an image based on the image information outputted from the image information storing apparatus, by realizing the effects corresponding to the inventions of the above claims 1 to 7, the performance of the image processing apparatuses can be improved.

[Brief Description of the Drawings]

[Figure 1]

Figure 1 illustrates a rough diagram of the whole arrangement of a digital multi-functional peripheral according to an embodiment of the present invention.

[Figure 2]

Figure 2 illustrates an example of an operation unit of the digital multi-functional peripheral of Figure 1.

[Figure 3]

Figure 3 illustrates an example of a display screen when a setting operation of a copy server mode is inputted in the operation unit of Figure 2.

[Figure 4]

Figure 4 illustrates a block diagram of a controlling apparatus of the digital multi-functional peripheral of the present embodiment.

[Figure 5]

Figure 5 illustrates a block diagram of a circuit arrangement of an image processing unit (IPU).

[Figure 6]

Figure 6 illustrates a timing of a page of image signal operated in a selector.

[Figure 7]

Figure 7 illustrates an arrangement of a software system of the digital multi-functional peripheral of the present embodiment.

[Figure 8]

Figure 8 illustrates a table for managing the usage status of an image storing area formed on a storing medium.

[Figure 9]

Figure 9 illustrates details of the first image information table for expressing a saving area and a usage status of each of unit image information of Figure 8.

[Figure 10]

Figure 10 illustrates details of the second image information table for expressing a usage status of each storing block area of Figure 8.

[Figure 11]

Figure 11 illustrates an example of a unit image formed with five blocks written to the first and second image information tables.

[Figure 12]

Figure 12 illustrates a flow diagram (part 1) of an operation procedure when new image information is written (registered) in the image information table.

[Figure 13]

Figure 13 illustrates a flow diagram (part 2) of an operation procedure when new image information is written (registered) in the image information table.

[Description of Symbols]

1 automatic document feeder (ADF)

2 document stage

6 contact glass

15 photoreceptor

17 fixing unit

27 developing unit

30 operation unit

31 liquid crystal touch panel

39 copy server key

50 reading unit

51 exposure lamp

54 CCD image sensor

57 writing unit

58 laser outputting unit

68 CPU

65 memory controller

66 image memory

75 HD

76 external storing apparatus

213 printer application

Figure 2

35 RESERVED

36 RESET

37 INITIAL SET

38 COPY

39 COPY SERVER

Figure 3

#1 DOCUMENT CAN BE READ, AND CAN BE SAVED IN MEMORY

#2 READ DOCUMENT

#3 COPY SERVER (TEXT SELECTION)

#4 SELECT TEXT

#5 USER ID

#6 TEXT NAME

#7 NUMBER OF PAGES

#8 TIME

#9 PRINTING ORDER

#10 SIZE

#11 □□□□□□□

#12 □□□□□□□

#13 DOCUMENT

#14 SET

#15 COPY

#16 SELECTED TEXT CAN BE COPIED TO EXTERNAL MEDIUM

#17 COPY TEXT TO EXTERNAL MEDIUM

#18 TEXT SELECTING AND PRINTING CONDITION CAN BE SET

#19 PRINTING STATUS

Figure 4

7 DETECT SET DOCUMENT

20 MAIN CONTROLLER

21 INTERMEDIATE CLUTCH

22 FIRST PAPER FEEDING CLUTCH

23 SECOND PAPER FEEDING CLUTCH

24 THIRD PAPER FEEDING CLUTCH

25 MAIN MOTOR

26 TRANSFERRING MOTOR

30 OPERATION UNIT

31 LIQUID CRYSTAL DISPLAY

32 to 35 KEY INPUT

Figure 5

57 WRITING UNIT

61 A/D CONVERTER

62 SHADING CORRECTION

63 MTF/□ CORRECTION

64 SELECTOR

65 IMAGE MEMORY CONTROLLER

66 IMAGE MEMORY

67 I/O PORT

71 WRITING □ CORRECTION

72 SCALING PROCESSING UNIT

73 IMAGE DATA

#1 TO MAIN CONTROLLER 20

#2 ADDRESS

#3 DATA

#4 SCSI CONTROLLER

#5 TO OPERATION UNIT

Figure 6

#1 MAIN SCAN SYNCHRONIZING SIGNAL

#2 FRAME GATE SIGNAL

#3 PIXEL SYNCHRONIZING SIGNAL

#4 IMAGE DATA

#5 LINE GATE SIGNAL

#6 SUB SCANNING EFFECTIVE AREA

#7 EIGHT CLOCKS

#8 MAIN SCANNING EFFECTIVE IMAGE

Figure 7

#1 DIGITAL PPC

200 SYSTEM CONTROL (SYSTEM CONTROLLER)

211 COPY APPLICATION

212 COPY SERVER APPLICATION

213 PRINTER APPLICATION

221 OPERATION UNIT CONTROLLER

222 PERIPHERAL MACHINE CONTROLLER

223 IMAGE FORMING APPARATUS CONTROLLER

224 IMAGE READING APPARATUS CONTROLLER

225 MEMORY UNIT

231 INPUT OUTPUT CONTROL

232 SCSI CONTROLLER

Figure 8

80 FIRST IMAGE INFORMATION TABLE

90 SECOND IMAGE INFORMATION TABLE

Figure 9

80 FIRST IMAGE INFORMATION TABLE

90 SECOND IMAGE INFORMATION TABLE

800 FIRST IMAGE INFORMATION 0

800a IMAGE NUMBER

800b START BLOCK NUMBER

800c SAVABILITY INFORMATION

#1 FIRST IMAGE INFORMATION 1

#2 FIRST IMAGE INFORMATION 2

#3 FIRST IMAGE INFORMATION 3

#4 FIRST IMAGE INFORMATION N - 1

#5 FIRST IMAGE INFORMATION N

Figure 10

80 FIRST IMAGE INFORMATION TABLE

90 SECOND IMAGE INFORMATION TABLE

900 SECOND IMAGE INFORMATION 0

900a NEXT BLOCK NUMBER

900b SAVABILITY INFORMATION

#1 SECOND IMAGE INFORMATION 1

#2 SECOND IMAGE INFORMATION 2

#3 SECOND IMAGE INFORMATION 3

#4 SECOND IMAGE INFORMATION N - 1

#5 SECOND IMAGE INFORMATION N

Figure 11

80 FIRST IMAGE INFORMATION TABLE

90 SECOND IMAGE INFORMATION TABLE

800 FIRST IMAGE INFORMATION 0

800a IMAGE NUMBER

800c SAVABILITY INFORMATION

#1 FIRST IMAGE INFORMATION 1

#2 FIRST IMAGE INFORMATION N

900 SECOND IMAGE INFORMATION 0

900b SAVABILITY INFORMATION

901 SECOND IMAGE INFORMATION 1

901b SAVABILITY INFORMATION

902 SECOND IMAGE INFORMATION 2

902b SAVABILITY INFORMATION

903 SECOND IMAGE INFORMATION 3

903b SAVABILITY INFORMATION

#3 SECOND IMAGE INFORMATION 4

#4 SECOND IMAGE INFORMATION 5

#5 SECOND IMAGE INFORMATION 6

#6 SECOND IMAGE INFORMATION N - 1

#7 SECOND IMAGE INFORMATION N

Figure 12

#1 START

S001 INITIALIZE LOOP PARAMETER FOR RETRIEVING FIRST IMAGE INFORMATION TABLE

S002 IS PARAMETER OVER?

S003 DETECT SAVABILITY INFORMATION OF FIRST IMAGE INFORMATION TABLE INDICATED BY LOOP PARAMETER

S004 SAVABLE?

S005 ADD LOOP PARAMETER

S006 REGISTER IMAGE NUMBER IN FIRST IMAGE INFORMATION TABLE

Figure 13

S007 INITIALIZE LOOP PARAMETER FOR RETRIEVING SECOND IMAGE INFORMATION TABLE AND OBTAINED BLOCKS PARAMETER

S008 IS PARAMETER OVER?

S009 DETECT SAVABILITY INFORMATION OF SECOND IMAGE INFORMATION TABLE INDICATED BY LOOP PARAMETER

S010 SAVABLE?

S011 ADD LOOP PARAMETER

S012 IS NUMBER OF BLOCKS 0?

S013 REGISTER OBTAINED BLOCK NUMBER IN FIRST IMAGE INFORMATION TABLE

S014 ADD NUMBER OF BLOCKS

S015 ARE BLOCKS TO BE OBTAINED HAVE BEEN OBTAINED?

S016 REGISTER FFFFH IN BLOCK NUMBER OF SECOND IMAGE INFORMATION TABLE OF BLOCK NUMBER OBTAINED PREVIOUS TIME

S017 REGISTER BLOCK NUMBER OBTAINED THIS TIME IN BLOCK NUMBER OF SECOND IMAGE INFORMATION TABLE INDICATED BY BLOCK NUMBER OBTAINED PREVIOUS TIME

S100 NOTIFY ERROR

S200 NOTIFY NORMAL TERMINATION

#1 END